Space Weather Forecast

Issued on Saturday, 13 April 2024 at 01:13 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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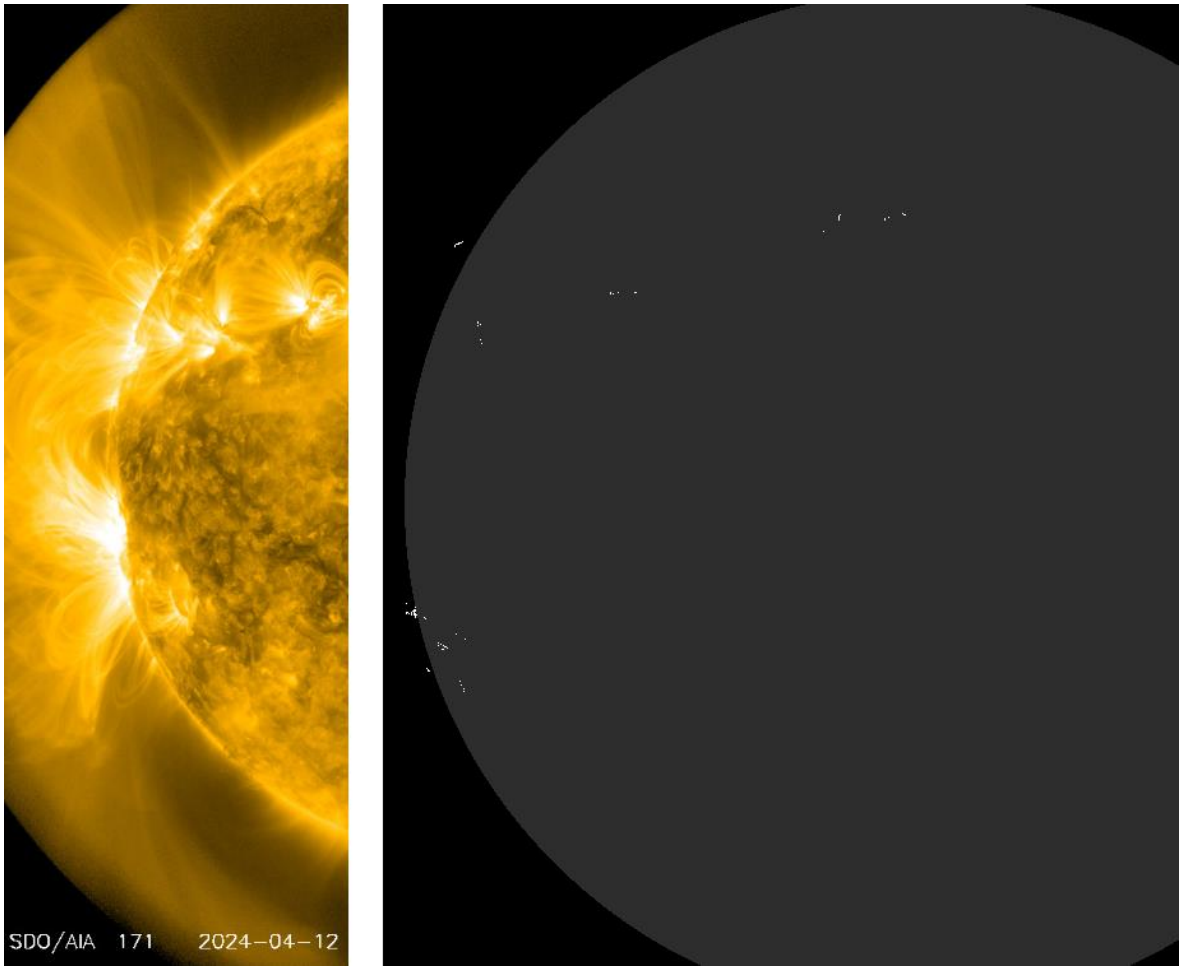
Space Weather Forecast Headline: Minor/Moderate geomagnetic storm G1/G2 likely, peak Monday 15 April. Increased daily chance of Moderate-class X-ray flares.

Solar Activity: Solar activity fell to low over the past 24 hours, with X-ray activity showing occasional mid-ranking Common-class activity, with a peak upper-end Common-class flare at 12/1755UTC from an arriving region over the northeastern solar horizon.

Figure 1: Left: false-colour extreme UV imagery from 12/2300UTC showing bright flux and an analogue of magnetic field arcing on the oncoming eastern solar horizon, likely harbouring successor regions to two previously large and active regions of a fortnight ago. Also shown is SIDC ROB visualisation of Common-class X-ray flares and above in the past 24 hours. Note the large contribution from the returning groups.



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There were five sunspot regions on the facing side of the Sun in the period, with a pair of magnetically unipolar groups (i.e. simple and less liable to significant flares) showing little change. The remaining three regions were magnetically bipolar, and changes within these were generally slow and slight.

The eastern solar horizon is likely to harbour still more significant regions beyond view, with substantial arcing of the magnetic field between hemispheres (visible in extreme UV imagery). This behaviour perhaps betrays the locations of successor regions to two large and significant active regions - both last visible from Earth around a fortnight ago.

There were numerous Coronal Mass Ejections (CMEs) observed on available satellite imagery in the period. Of these, the most significant is thought to be a faint partial halo emitted from a 'filament eruption' (arc of plasma) narrowly in the southwest and occurring around 12/0020UTC. This feature has been analysed by two successive forecasters, with both independently obtaining very similar results and suggesting an arrival early in the UTC day of Monday 15 April.

Solar Wind / Geomagnetic Activity: Solar winds showed a slow regime. The solar wind speed decreased very slightly from slightly elevated to background levels, while the number of particles in the solar wind remained near its long-term average. The associated magnetic field was very steady within background levels, while the north-south component showed a small-scale erratic tendency.

The net result of the above solar wind measures was for predominantly quiet geomagnetic activity.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate solar activity is likely, largely the result of returning successor regions to two large sunspot groups over the eastern solar horizon into the current UTC weekend. This trend is stable throughout, with no significant active region departures over the western solar horizon, but the new daily level of risk may yet be adjusted once the new arrivals more fully present for analysis.

Solar Wind / Geomagnetic Activity: The main consideration for the forecast period is the prospect of up to two potential Earth-directed CMEs, although estimates have been slightly revised. The first, resulting from a filament eruption around 11/0540UTC, gives the potential for a glancing impact later on day two, Sunday 14 April. The second CME arises from the filament eruption from near centre-disc around 12/0020UTC, with a most likely arrival time for this feature early on 15 April.

The 'coronal hole'-based fast wind forecast is expected to be the lesser contributor, with the onset of any fast wind most likely occurring later in the current UTC day (13 April) and on into 14 April.

Geomagnetic activity is forecast to increase from current mainly quiet levels to a chance of G1/G2 Minor/Moderate geomagnetic storms late in the UTC weekend and into the very start of the new UTC working week, with up to two CMEs inbound - especially if any arrivals combine. Activity should then ease back to mainly quiet levels through day four (Tuesday 16 April).

Energetic Particles / Solar Radiation: No solar radiation storms are expected.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	5	50	70	5
Strong	G3	No	1	10	10	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	50	50	50	50
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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